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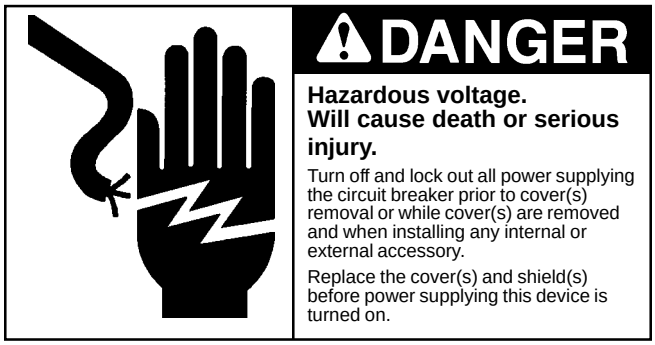
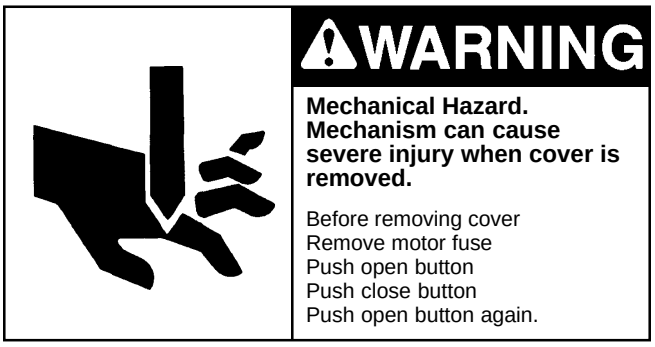
Bellefontaine, OH 43311 U.S.A.

Installing Sensitrip™ and SB Electronic Trip Units In Zone Selective Interlocking or ACCESS™ Communications Systems





Introduction

This Instruction Sheet provides the component selection, cabling and interconnect information to configure Siemens Sensitrip MCCB and SB Systems Breaker ICCB's in either a Zone Selective Interlocking (ZSI) network or in an ACCESS™ communications system. Installed ICCB SB breakers without communication capability may be field upgraded by Siemens Field Service personnel only. MCCB breakers may be field upgraded by Siemens Field Service or the end user. Refer to Figure 1 for a diagram of the possible interconnect schemes described in the following scenarios.

Referenced Publications

The following publications are referenced in this instruction sheet, with the latest versions obtainable through the local Siemens sales office:

_ ACCESS™ Systems Installation Guide [Manual SG-6028-01]
_ Isolated Multi-Drop RS-232 to RS-485 Converter, Operator's Manual [Manual SG-6048-01]
_ Multiplexer Translator (MT), Information and Instruction Guide [Bulletin 2.21-1A]
_ Expansion Plug for Siemens Multiplexer Translator, Information and Instruction Sheet [Bulletin 2.21-2A]
_ Electronic Trip Unit for SB Encased Systems Breakers, Information and Instruction Guide [Bulletin 2.20-3A]
_ Sentron Systems Breaker, Energy Communicating Trip Unit, Information and Instruction Guide [Bulletin IPIM-2208]

Referenced Components

The following components are referenced in this instruction sheet, with the latest versions obtainable through the local Siemens sales office:

- Siemens **MTZ** (Multiplexer Translator, Zone Interlock) [Cat. No. **MTZ**] – a microprocessor-based device required for configuring and controlling a Zone Selective Interlocking (ZSI) network of up to eight (8) Sensitrip or SB circuit breakers; multiple MTs may be interconnected for a total of 31 MT's and 248 breakers.
- Siemens **MTA** (Multiplexer Translator, ACCESS) [Cat. No. **MTA**] – a microprocessor-based device for configuring and controlling up to eight (8) Sensitrip MCCB's and/or SB Trip Units within an ACCESS Communications System; multiple MTs may be interconnected for a total of 31 MT's and 248 breakers. The **MTA** also provides Zone Selective Interlocking capability. (Note: the SB-EC trip unit is direct ACCESS compatible but requires an **MTZ** or **MTA** for ZSI capability)
- Siemens type **EP** (Expansion Plug) - an isolation device to connect Sensitrip MCCB's and SB trip units to an **MTA** or **MTZ**. One (1) per trip unit when required.

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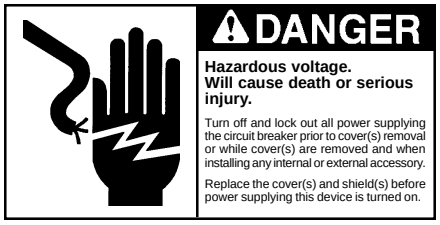


Installing Sensitrip™ and SB Electronic Trip Units In Zone Selective Interlocking or ACCESS™ Communications Systems

Breaker Type	Frame Size	Mounting Type	Cat. No.
SB ICCB	1200A, 2000A	Fixed	EPSBFMK ①
		Drawout	EPSBDMK ①
SB ICCB	3200A, 5000A	Fixed	EPSB4FMK ①
		Drawout	EPSB4DMK ①
Sensitrip MCCB	ALL	ALL	EP

① Factory wired when ACCESS communications or ZSI is ordered for the SB breaker from the factory.

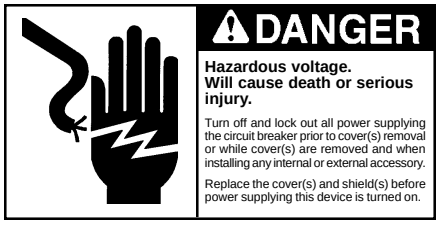
- Siemens **EPC** Ribbon Cable [Cat. No. **EPC##** (where: **##** = 08, 12, or 18 inches)] – a 16-conductor cable used to connect the Sensitrip MCCB to an **EP**; qty. of 1 per trip unit. Order longest standard length when unsure of application.
- Siemens **MTC** 4-Wire Telephone Cable [Cat No. **MTC##** (where: **##** = 08, 15, 25, or 50 feet)] – a 4-conductor phone cable, with a male RJ11 connector on each end, to connect an **EP** to an MT for Sensitrip MCCB applications or to connect adjacent MTs together. **MTC** cables may be special ordered in alternate lengths up to 100 feet. Order longest standard length when unsure of application.
- Siemens **MTCSB** 4-Wire to RJ11 Cable [Cat. No. **MTCSB##** (where: **##** = 8, 15, 25, or 50 feet)] – a 4-conductor phone cable with a male RJ11 connector on one end and 4 spade lugs on the other end; used with SB Trip Units with rear connected, factory installed **EPSB** expansion plugs; Used to connect an MT to the factory installed **EPSB** expansion plug via the SB breaker secondary terminals or sliding disconnects. **MTCSB** cables may be special ordered in alternate lengths up to 100 feet. Order longest standard length when unsure of application.
- Siemens Isolated Multi-Drop Converter [Cat. No. 18-658-852-537] – an optional device used to convert four (4) RS-485 communications loops to one (1) RS-232 port for host PC communications.

Sensitrip MCCB Breakers

All Siemens Sensitrip Molded Case Circuit Breakers have the capability to function in both a ZSI network and within an ACCESS™ communications system. A separate device, the Siemens Multiplexer Translator, enables up to eight (8) breakers to communicate in either a ZSI-only scheme (via an **MTZ**), or in an ACCESS™ communications system (via an **MTA**) plus ZSI capability. The following scenarios describe the steps and accessories required to configure these types of systems:

A. Sensitrip MCCB Zone Selective Interlocking (only)

Components Required:
- Siemens **MTZ** - one per 8 trip units
- Siemens **EP** expansion plug - one per trip unit
- Siemens type **EPC** cable - one per trip unit
- Siemens type **MTC** cable - one per trip unit



Installing Sensitrip™ and SB Electronic Trip Units In Zone Selective Interlocking or ACCESS™ Communications Systems

Installation:

1. Connect an **EPC** ribbon cable from the front of the Sensitrip Trip Unit's Test Connector to an **EP**; note that the connector is keyed, so that it can only be inserted one way.
2. Based on the site's coordination study, configure the **EP**'s DIP switches for Short Time and/or Ground Fault ZSI per the **EP** Information and Instruction Sheet.
3. Connect an **MTC** cable from the **EP** to one of eight **MTZ** communication ports.
4. Configure the **MTZ**'s DIP switches to identify the zones for each breaker, per the site's coordination study and the **MTZ** instruction sheet.
5. If multiple MT's are used, the "Com" terminal from the first MT's "SEABus Out" port must be connected to the "Com" terminal of the next MT's "SEABus In" port on each MT being used.
6. See figure 1 for system connection diagram.

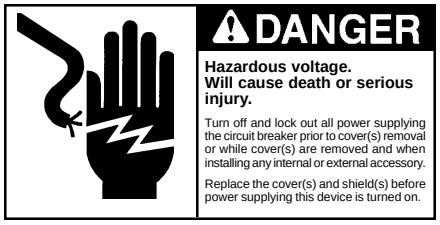
B. Sensitrip MCCB ACCESS Communications (with or without Zone Interlocking)

Components Required:

- Siemens **MTA** - one per 8 trip units
- Siemens **EP** expansion plug - one per trip unit
- Siemens type **EPC** cable - one per trip unit
- Siemens type **MTC** cable – one per trip unit

Installation:

1. Connect an **EPC** ribbon cable from the front of the Sensitrip Trip Unit's Test Connector to an **EP**; note that the connector is keyed, so that it can only be inserted one way.
2. If ZSI is required, configure per the site's coordination study, and configure the **EP**'s DIP switches for Short Time and/or Ground Fault ZSI per the **EP** Information and Instruction Sheet. If ZSI is not required, adjust the **EP**'s DIP switches to 'NO ZONE' (0000).
3. Connect an **MTC** cable from the **EP** to one of eight **MTA** communication ports.
4. If ZSI functionality is additionally required, per the site's coordination study, configure the **MTA** to identify the zones for each breaker according to the **MTA**'s instruction sheet. If multiple MT's are used, the "Com" terminal from the first MT's "SEABus Out" port must be connected to the "Com" terminal of the next MT's "SEABus In" port on each MT being used.
5. If ZSI is not required, set the **MTA**'s Device Configuration DIP switches to 'NO ZONE' (00) and the **MTA**'s Device Type DIP switch to 'MCCB/ICCB' (0001).
6. Connect RS-485 twisted pair communication cable to the **MTA**'s A(+), B(-) terminals and only one end of the cable's shield to the MT's GND terminal. Configure the ACCESS system network, per *Installing the ACCESS System* manual. An Isolated Multidrop Converter may be installed as an option. See figure 1 for system connection diagram.



Installing Sensitrip™ and SB Electronic Trip Units In Zone Selective Interlocking or ACCESS™ Communications Systems

SB System Breakers

The following sections describe both types of SB trip units, the standard Type 'TL' unit with rotary switches, and the SB Energy-Comm (SB-EC) Trip Unit with keypad and display. Since the SB-EC Trip Unit has integral communications capability, the **MTA** device is *not* required to connect within an ACCESS system, however for SB-EC Trip Units in a ZSI system, an **MTZ** or **MTA** is required.

The type **EPSB** expansion plug is factory wired to the SB breaker trip unit's rear connector and also located near and wired to the SB breaker's secondary terminal block for fixed mount breakers or sliding disconnects for drawout breakers. These connections are factory wired when the SB breaker is ordered with the standard switch based type 'TL' trip unit for ACCESS communications or for any trip unit with ZSI capability.

Installed ICCB SB breakers without communication capability may be field upgraded for communication capability by Siemens Field Service personnel only.

The **MTCSB** cable is used to connect an **MTA** or **MTZ** to an **EPSB** expansion plug via the SB breaker secondary terminal block or sliding disconnect.

A. SB Breaker Zone Selective Interlocking (only)

1. All SB Breaker Trip Units

Components Required:
- Siemens type **MTZ** - one per 8 trip units
- Siemens type **EPSB** expansion plug - one per trip unit, factory wired
- Siemens type **MTCSB** cable – one per trip unit

Installation:

1. When the factory-installed ZSI option is present, the **EPSB** expansion plug is already wired to the breaker and secondary control terminals. Connect an **MTCSB** cable's spade lugs from the appropriate SB breaker's secondary terminals (LB9, 10, 11, & 12) to one of eight communication inputs on the **MTZ**.
2. If multiple MT's are used, the "Com" terminal from the first MT's "SEABus Out" port must be connected to the "Com" terminal of the next MT's "SEABus In" port on each MT being used.
3. Based on the site's coordination study, configure the expansion plug's DIP switches for Short Time and/or Ground Fault ZSI per the **EP** Information and Instruction Sheet.
4. Configure the **MTZ** to identify the zones for each breaker, per the site's coordination study and information and instruction sheet. Refer to figure 1 for system connections diagram.

B. SB Breaker ACCESS Communications (with or without Zone Interlocking)

1. Standard type 'TL' switch-based trip unit

Components Required:
- Siemens type **MTA** - one per 8 trip units
- Siemens type **EPSB** expansion plug - one per trip unit, factory wired
- Siemens type **MTCSB** cable – one per trip unit

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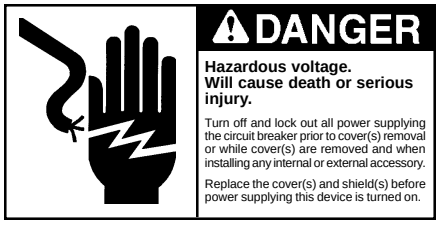

Installing Sensitrip™ and SB Electronic Trip Units In Zone Selective Interlocking or ACCESS™ Communications Systems

Installation:

1. When the factory-installed ACCESS communications option is present, the **EPSB** expansion plug is already wired to the breaker and secondary control terminals. Connect an **MTCSB** cable's spade lugs to the appropriate SB breaker's secondary terminals (LB9, 10, 11, & 12) then to one of eight communication inputs on the **MTA**.
2. If ZSI functionality is additionally required, per the site's coordination study, configure the expansion plug's DIP switches for Short Time and/or Ground Fault ZSI per the expansion plug's Information and Instruction Sheet. Configure the **MTA** to identify the zones for each breaker, per the site's coordination study and the **MTA**'s instruction sheet.
3. If multiple MT's are used, the "Com" terminal from the first MT's "SEABus Out" port must be connected to the "Com" terminal of the next MT's "SEABus In" port on each MT being used.
4. If ZSI is not required, set the expansion plug's DIP switches to NO ZONE (0000), the **MTA**'s Device Configuration DIP switches to NO ZONE (00) and the Device Type **MTA**'s DIP switch to MCCB/ICCB (0001).
5. Connect RS-485 twisted pair communication cable to the **MTA**'s A(+) and B(-) terminals. Connect only one end of the cable's shield to the MT's GND terminal. Configure the ACCESS system network, per *Installing the ACCESS System* manual. An Isolated Multidrop Converter may be installed as an option. See figure 1 for system connection diagram.

2. SB-EC Trip unit

Since the SB-EC Trip Unit has direct communications with an ACCESS network, no intermediate devices are required unless ZSI functionality is required.
If ZSI is required, connect as per above using an MTA if type 'TL' SB breaker trip units or Sensitrip MCCB trip units are part of the overall system and both ACCESS communications and ZSI are required
Any application requiring only ZSI requires an MTZ configured as above.
If multiple MT's are used for ZSI functionality, the "Com" terminal from the first MT's "SEABus Out" port must be connected to the "Com" terminal of the next MT's "SEABus In" port on each MT being used.
As referenced in the SB-EC Trip Unit Information and Instruction Manual, the trip unit's ACCESS communication lines are located on the breakers secondary control terminals <LB5> to RS485(+), <LB6> to RS-485(-), and <LB7> to Shield/Common. Refer to figure 1 for system connection diagram.

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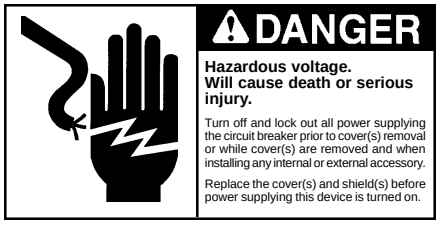

Installing Sensitrip™ and SB Electronic Trip Units In Zone Selective Interlocking or ACCESS™ Communications Systems

Summary

The following table summarizes the required *Component Types* per each trip unit in the system. One component per trip unit unless otherwise noted:

Component Selection Guide ①

	Trip Units and Application				
Component Type	ZSI (only) with Sensitrip MCCB's	ACCESS and/or ZSI with Sensitrip MCCB's	ZSI (only) with all SB-EC Trip Units	ACCESS and/or ZSI with SB-TL Trip Units	ACCESS with SB-EC Trip Units
EP	✔	✔			
EPSB			✔	✔	
MTZ ②	✔		✔		
MTA ②		✔		✔	
EPC Cable	✔	✔			
MTC Cable ③	✔	✔			
MTCSB Cable			✔	✔	

①When ordered with circuit breaker from the factory.
②One MTA or MTZ per eight trip units when required.
③Always required when multiple MT's are used. One additional cable per each additional MT.

Notes:

1. It is recommended that for long, single-ended runs (over 1000 ft.), that a 120 ohm, 1/4 watt terminating resistor between the Data+ and Data- terminals of the furthest devices be added. Adding a terminator resistor is not an absolute requirement, but using it will minimize reflected interference on the communication bus.
2. Both loop and straight RS-485 topologies are acceptable. The advantage of the straight topology is further distance to the last device (4000 ft.) The advantage to the loop topology is that the devices will continue to communicate even with a break in the line. The disadvantage of the loop topology is the distance to the furthest device is only 2000 ft.
3. A Siemens Isolated Multi-Drop Converter [Cat. No. 18-658-852-537] may be used as an optional device used to convert four (4) RS-485 communications loops to one (1) RS-232 port for host PC communications.
4. Protocol converters are available from the Siemens ACCESS group to provide plug-and-play capability with over 25 different PLC protocols (Siemens S7, Modbus, etc.), Profibus, DeviceNet, and LonWorks.
5. If multiple MT's are used for ZSI applications, the "Com" terminal from the first MT's "SEABus Out" port must be connected to the "Com" terminal of the next MT's "SEABus In" port on each MT being used.
6. Installed ICCB SB breakers without communication capability may be field upgraded by Siemens Field Service personnel only. MCCB breakers may be field upgraded by Siemens Field Service or the end user.
7. Refer to Installing the ACCESS™ System Installation Guide [Manual SG-6028-01] for proper system shield and grounding connections schemes.

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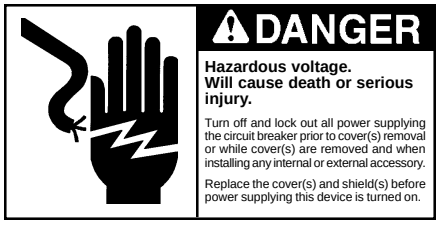

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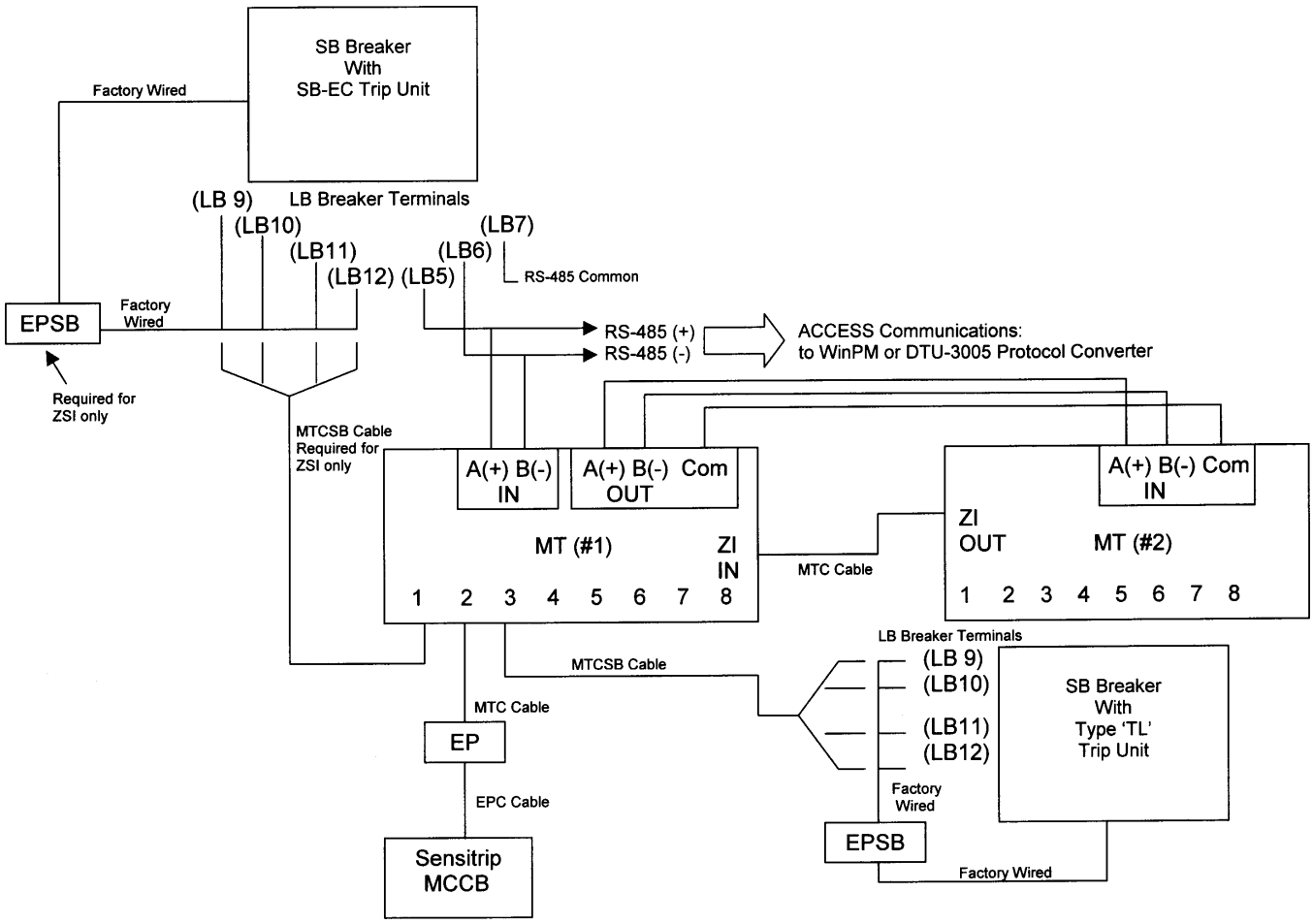
Figure 1 - System Connection Diagram